Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matter of:

Amendment of the Commission's Rules to Establish New Personal Communications Services	}	GEN Docket #90-314

Reply Comments of Motorola Inc. to the Comments and Oppositions to Petitions for Reconsideration of the PCS Second Report and ORder

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I. Standards for Common Air Interfaces are Necessary to Realize the PCS Vision.

The PCS allocation is a significant milestone for the U.S. in implementing multiple and varied, new and interactive services. PCS can be one of the leaders of the information superhighways which are an important initiative of the Clinton-Gore Administration. One of the tenets of the National Information Initiative - the NII - is that the services will be available to many Americans and that interconnectivity will improve education, the workplace and the quality of life for the American public.

This PCS vision may be reduced to an insignificant part of this telecommunications future vision unless standards for Common Air Interface (CAI) are addressed now. The telecommunications industry and the Commission have created the expectation that PCS will provide the American public with direct, dynamic person-to-person connectivity in new services. However, without CAI standards, this will not happen. It is extremely over optimistic for the industry or the FCC to expect that the largest single allocation of spectrum in FCC history for public wireless service will be successful without a requirement to adhere to industry developed standards that promote interoperability and compatibility.

FCC leadership on the standards issue is critical to the success of the PCS vision. The FCC needs to 1) direct ANSI accredited industry standards bodies such as TIA and T-1 to adopt interim PCS equipment standards no later than September 1994, and 2) modify its rules to include a requirement that PCS equipment authorization requests must certify compliance with interim industry standards developed by an ANSI accredited standards body.

Manufacturers and service providers who have opposed compliance with interim CAI standards for PCS claim that requiring standards will delay PCS service

to the public. Motorola believes such "delay" is more illusion than reality. First, the Commission must conduct over 2500 auctions in the 1.8 - 2.2. GHz band alone.[1] Second, additional processing and public notice apparently will be required before auction winners will actually receive licenses and construction permits. Finally, operators must negotiate site agreements in many cases and address the myriad of other issues to be resolved before service can actually be offered to the public. Therefore, Motorola believes requiring standards will not add to the delays already inherent in the process of bringing service to the public. Without a requirement for standards, there is no assurance that any of the various two-thousand-plus systems will be interoperable one with another. What then will the American public think of PCS? Commission leadership at this critical juncture, as suggested, can greatly impact this outcome.

Further, industry has made substantial progress. Any member of TIA and T-1 involved with the standards setting process for PCS common air interfaces would report today that these bodies (and the JTC) are well underway in developing the PCS standards. So much so, that Motorola has recommended that the FCC can and should insist upon n accelerated period - no later than September 1994 - for TIA and T-1 to adopt interim PCS equipment standards. Eight months from now and 3 months after the first scheduled competitive bidding for PCS licenses is not a schedule designed to delay. It is reasonable, prudent and possible. It is also the right step to ensure the best possible success of PCS.

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[1] In addition, over 5500 auctions will be required for 900 MHz narrowband PCS. Some time will certainly be required for the FCC to conduct over 8000 auctions, particularly since this is a new process for both the Commission and the communications industry.

II. Replies to Technical Comments

A. The FCC Needs to Specify Frequency Bands for FDD Operation Licensed PCS Services.

Omnipoint opposes Motorola recommendations that the FCC create uplink/downlink bands by restricting the power of TDD devices. Omnipoint believes such action would reduce flexibility to implement diverse technologies and suggests that Motorola's recommendation is without technical merit.

Motorola's objective on this issue is to assure minimal interference between PCS systems operating in adjacent frequency blocks. The Second Report and Order defines out of band emissions as any frequency outside of all PCS spectrum; there are no rules for PCS operators in adjacent blocks. Accordingly, in our petition for reconsideration filed December 8, Motorola recommended that the rule be modified to apply out of band emission limits at the edge of a given licensee's block of spectrum.

However, even if "out of band" emission specifications are applied as recommended, location of base transmitters in a frequency band adjacent to base receivers can cause destructive interference for base sites operating in the same geographic area. This issue becomes even more important if the Commission increases base site power to 1000 watts ERP - a recommendation which has wide industry support. Finally, full power Time Division Duplex (TDD) operating adjacent to another system's base receiver would similarly cause destructive interference. These considerations are the major factor behind Motorola's

recommendation that for Frequency Division Duplex (FDD) operation, base and mobile/portable bands be established.

B. The FCC Should Support the WINForum Recommendations for Unlicensed PCS Etiquette.

The issues of channelization for the isochronous sub-bands and the objective of "fair access" were hotly debated in WINForum. WINForum ultimately settled on 1.25 MHz channels as the best approach to balance flexibility and spectrum efficiency. Motorola supports the recommendations of WINForum and recommended in its Petition for Reconsideration that the two 5 MHz channels in the 1890-1900 MHz isochronous sub-band be changed to eight 1.25 MHz channels to be consistent with WINForum recommendation for isochronous devices.

Ericsson and Omnipoint each object to this recommendation alleging that 1.25 MHz channelization discriminates against certain technologies. Ericsson points out that CDMA/TDD will require at least 2.5 duplex channels since state of the art DS-CDMA FDD uses two 1.25 MHz channels for a duplex connection. Ericsson further states that "reliable co-existence is also based on a high probability that a device, when interfered, can find another, better access channel on which to escape.[2]"

In reply, Motorola notes that it is, in fact, possible to operate CDMA/TDD in a single 1.25 MHz channel with a simple reduction in processing gain of 3dB. No specific technology - i.e. FDMA, TDMA or CDMA - is excluded in the WINForum etiquette. Although some specific implementations of these technologies are excluded the objective of "fair access" by multiple technologies is maintained.

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[1] page 3, Technical Appendix to the Opposition of The Ericsson Corporation to Petitions for Reconsideration, December 30, 1993.

While Ericsson states a concern for an escape channel, this can only occur if another channel is available. The wide, 5 MHz channels are likely to preclude a device when interfered with from finding available spectrum and would impact the quality of service which could be provided.

Finally, the lower spectrum efficiencies and lack of sufficient number of channels which result from allowing 5 MHz channelization is exacerbated in environments with low propagation loss. Propagation paths which approach free space between buildings can occur in downtown metropolitan areas with tall buildings. This significantly increases the reuse distances and the size of the geographic area which must be served by the available spectrum without reuse. Since many different systems cannot share the same frequencies and can only co-exist by occupying different channels, providing as many channels as reasonably possible which meet users' needs is extremely important.

The technical reasons WINForum favors 1.25 MHz channelization were many and are tied to achieving the objective of fair access. A single transmitter is prevented from monopolizing a large segment of spectrum. The plan enhances co-existence of several different systems and technologies in the same geographic area. Further, the overall spectrum efficiency is improved by reducing the spectrum occupancy of systems with low capacity. Alternatively, with 5 MHz channels the control and signalling channel of a single cell could utilize one fourth of the entire isochronous allocation, even if no communication links are active. Motorola believes that fair access to the spectrum is paramount and should not be compromised. Thus, the benefits of specifying 1.25 MHz channels in both 10 MHz isochronous sub-bands outweigh the considerations cited by Ericsson and Omnipoint.

Motorola also reiterates its support for the listen-before-talk (LBT) threshold of 50 dB above thermal noise as the best compromise between maximizing frequency reuse and providing reasonable communications ranges in high density, interference limited environments. The potential for interference between systems is increased as the threshold is raised. Ensuring continuous communications even at the value of 50 dB above thermal noise requires a cell radius of less than 10 meters. If the threshold is raised higher, systems designers will be inhibited from providing cost effective solutions with reasonable communications ranges. Higher thresholds result in impractical cell radii and create a "free-for-all" where the LBT mechanism becomes meaningless. Indeed, one could argue that companies which believe that such extremely short communications ranges are practical, should utilize optical communications rather than radio communications.

Further, the current rules provide for an effective method to greatly increase reuse without changing the current threshold. This method is simply to reduce the transmit power of devices by a small amount. For example, a 5 dB reduction in transmit power permits a device to increase its LBT threshold 5 dB. The intra-system power levels are reduced by 5 dB also which effectively doubles the impact of the power reduction. This means that a 5 dB power reduction provides an intra-system reuse equivalent to an LBT threshold of 60 dB above thermal noise. Therefore, Motorola opposes any proposal which seeks to raise this level beyond 50 dB above thermal noise, based on the highly undesirable consequences of such a change and the alternative methods of increasing reuse currently provided for in the rules.

Some commenting parties have proposed increasing the LBT monitoring period of 10 ms to 20 ms. This higher value penalizes narrower band technologies since many frequency windows must be monitored for the longer period. The resulting impact for the user is slower access time and shorter and reduced quality of

service since re-establishment of an existing communications link is delayed when interrupted by interference. Therefore, Motorola opposes any increase of the LBT monitor period and frame period.

The WINForum etiquette as adopted by the FCC in the Second Report and Order was forged in a long process of commercial and technical debate.[3] The parameter values which resulted are not independent and any change must involve a lengthy review period and resumption of the debate process. This is as it should be for anything less - even seemingly innocent changes - risks unforeseen technical consequences. Therefore, Motorola strongly endorses the WINForum etiquette and opposes requests for parameter value changes and rule changes attempting to circumvent the WINForum process.

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[3] Motorola notes that some commenting parties have alleged that WINForum did not follow its own procedures and processes for consensus. In Motorola's view this is incorrect. While it is true that not all manufacturers, including Motorola, got consensus on matters to which they were partial, the discussions of technology and policy were fair and open; the procedures were followed and the outcome is as close to an industry consensus as possible.

CERTIFICATE OF SERVICE

I, Alice de Séve, of Motorola, Inc., do hereby certify that on this 13th day of January, 1994 a copy of the foregoing "Reply Comments" was sent to each of the following by first-class mail, postage-prepaid except where service by hand is indicated(*):

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